

Scott A. Beardsley

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EDUCATION

Ph.D.	Biomedical Engineering, Boston University, Boston MA <i>"Complex motion processing mechanisms in the posterior parietal lobe: Psychophysics and computational modeling"</i>	May 2001
B.S.	Physics & Mathematics, <i>summa cum laude</i> , University of Wisconsin-Whitewater, Whitewater, WI	May 1995

PROFESSIONAL EXPERIENCE

Medical College of Wisconsin , Milwaukee WI	July 2016-present
Associate Professor, Department of Biomedical Engineering and Clinical and Translational Science Institute, Medical College of Wisconsin	
Marquette University , Milwaukee WI	Sept. 2014-present
Associate Professor, Department of Biomedical Engineering Director, Integrative Neural Systems Laboratory	
Medical College of Wisconsin , Milwaukee WI	Jan. 2011-July 2016
Assistant Adjunct Professor, Clinical and Translational Science Institute	
Boston University , Boston MA	Jan. 2007-Jan. 2014
Visiting Research Assistant Professor, Department of Biomedical Engineering	
Marquette University , Milwaukee WI	Jan. 2006-Sept. 2014
Assistant Professor, Department of Biomedical Engineering Director, Integrative Neural Systems Laboratory	
Boston University , Boston MA	May 2001-Dec. 2005
Postdoctoral Research Associate, Department of Biomedical Engineering	
Research Assistant, Brain and Vision Research Laboratory	June 1997-May 2001
University of Wisconsin – Whitewater , Whitewater WI	Sept. 1992- May 1995
Research Assistant, Physics Department	
National Solar Observatory , Sunspot NM	Summer 1994
Research Internship	
University of Michigan , Ann Arbor MI	Summer 1993
Research Internship, Department of Physics	

TEACHING EXPERIENCE

Marquette University , Milwaukee WI	
BIEN 4380: Bioelectronics Design Lab 1	Fall 2016-2020
BIEN 4390: Bioelectronics Design Lab 2	Spring 2016-2021
BIEN 6200: Biomedical Signal Processing	Spring 2019

	<i>Scott Beardsley</i>
BIEN 6210: Advanced Signal Processing	Fall 2013
BIEN 1100: Introduction to Biomedical Engineering Methods 1	Fall 2014, 2015
BIEN 1110: Introduction to Biomedical Engineering Methods 2	Spring 2015, 2016
BIEN 3310: Control Systems for Biomedical Engineers	Spring 2010-2012, Fall 2015
BIEN 4600/5600: Neural Engineering	Fall 2011, 2014, 2017, 2018 Spring 2021
BIEN 100/2300: Biomedical Circuits and Electronics	Fall: 2006, 2008-2010 Spring: 2007-2010, 2013-2015, 2020
BIEN 6931: Computational Neuroscience	Fall 2009
BIEN 151: Feedback and Control in Physiological Systems	Fall 2007, 2008
BIEN 151: Neural Engineering: Coding and Control Systems	Spring 2006

Boston University, Boston MA

BE 570: Introduction to Computational Vision, BME-REU Mentor	Fall 2001, 2002 Summer 1998, 1999
Teaching Assistant: BE 512: Biomedical Instrumentation	Spring 1997
Teaching Assistant: BE 410/510: Biosignal Detection & Measurement	Fall 1996

RESEARCH INTERESTS

Neuroengineering – Neural coding/decoding
 Human visuo-motor processing (integrated experimental/computational approaches)
 Multiple Sclerosis
 Functional neuroimaging

SCIENTIFIC AND PROFESSIONAL AFFILIATIONS

IEEE-EMBS	2011-present
Biomedical Engineering Society	2006-present
Sigma Xi – Scientific Research Society	2006-present
Society for Neuroscience	1996-present
Vision Sciences Society	2002-2008

HONORS AND AWARDS

Way Klingler Young Scholar Award, Marquette University	2012
National Academies Keck Futures Initiative Conference Fellowship	2006
GAANN Fellowship, Boston University	1995-1997
A. A. Upham Scholarship for Science, University of Wisconsin – Whitewater	1994
Marian Baldwin Schlicker Mathematics Award, University of Wisconsin – Whitewater	1994
Physics Department Scholarship, University of Wisconsin – Whitewater	1994
Johnson Wax Foundation Scholarship, University of Wisconsin – Whitewater	1991-1995
National Dean's List, University of Wisconsin – Whitewater	1991-1995

GRANTS AND RESEARCH SUPPORT

Funded

Alvin W. and Marion Birnschein Foundation <i>Effects of visual feedback on balance control in people with Multiple Sclerosis</i> Role: PI	12/1/19 – 11/31/20
Bleser Family Foundation (PI: Whelan) Neurology research program in brain blood flow Role: Co-I	3/1/19 – 12/31/22
NSF-1854158 (PI: Mrotek) IRES Track 1: Physical state estimation for control coordination and behavior monitoring Role: Co-PI	4/1/19-3/31/22
Alvin W. and Marion Birnschein Foundation Delay adaptation training to improve arm function in persons with multiple sclerosis Role: PI	1/1/18 – 12/31/18
COE-Legacy Initiative Global Innovation Grant (PI: Silver-Thorn) Dynamic EMG control of powered below-knee prostheses Role: Co-PI	1/1/17 – 12/31/17
MU Innovation Fund (PI: Schmit) Research Program of the Stroke Rehabilitation Center of Southeast Wisconsin R2 Multimodal brain imaging as a predictor of stroke recovery Role: Lead Investigator	7/1/15 - 6/30/16
H133E100007 (Project Director: G.F. Harris) U.S. Department of Education, National Institute on Disability and Rehabilitation Research: Rehabilitation Engineering Research Center on Technologies for Children with Orthopedic Disabilities R2 Diffusion tensor imaging and restoration of upper & lower limb function in children with CP Role: Lead Investigator R1 Microstructural characterization of soft and hard tissue in the pediatric osteogenesis imperfecta and clubfoot populations Role: Investigator	10/1/13 – 9/30/15
Advancing a Healthier Wisconsin Assessment of coupling between mass neural activity and the hemodynamic response in humans Role: PI	4/1/13 – 3/31/14
Alvin W. and Marion Birnschein Foundation Re-training strategies to improve arm function in persons with Multiple Sclerosis Role: PI	1/1/13 – 12/31/13
Marquette University - Way Klingler Young Scholar Award	9/1/12 – 12/31/12

CTSA UL1RR031973-02 Scott Beardsley
4/1/11 - 3/31/12
Impairments in sensorimotor control and their contribution to tremor and dysmetria in persons with MS
Role: PI

Alvin W. and Marion Birnschein Foundation 1/1/11 – 12/31/11
Sensorimotor control metrics of tremor and dysmetria in persons with Multiple Sclerosis
Role: PI

R01 NS64100-01A1 (PI: Vaina) 7/17/09 - 7/16/11
Perception and recovery of motion for visually guided behavior in humans
Role: Co-I (28% effort)
Experiment development, parametric exploration of tasks with control subjects, and psychophysical interpretation of the experimental data in all sections.

College of Engineering, Junior Faculty Research Incentive Program 1/1/07 - 10/1/07
A systems identification approach to characterizing sensory feedback during reach and its deficits in patients with Multiple Sclerosis
Role: PI

Marquette University, Regular Research Grant / Summer Faculty Fellowship 1/1/07 - 7/15/07
Adaptive decoding of neural signals for long-term control of an assistive device
Role: PI

Equipment grants - Funded

NSF-MRI GPGPG (PI: Feng – Virginia Tech) July 2010
MRI-R² Consortium: Acquisition of a heterogeneous supercomputing instrument for transformative interdisciplinary research
Role: Collaborator (no effort)

NSF OCI-0923037 (PI: Struble) July 2009
MRI: Acquisition of a Parallel Computing Cluster and Storage for the Marquette University Grid (MUGrid)
Role: Collaborator (no effort)

PEER REVIEWED JOURNAL PUBLICATIONS (* indicates student)

Published & In Press

1. *Riem L., **Beardsley S. A.**, Schmit B. D., (2021) The effect of visual field manipulations on standing balance control in people with multiple sclerosis, *Gait & Posture*, 90, p. 92-98. doi: 10.1016/j.gaitpost.2021.08.010.
2. *Zabre-Gonzalez E., *Riem L., Voglewede P., Silver-Thorn B., Koehler-McNicholas S., **Beardsley S. A.**, (2021), Continuous myoelectric prediction of future ankle angle across ambulation conditions and their transitions, *Front. Neurosci. - Neuroprosthetics.*, 15, p. 1-13., doi: 10.3389/fnins.2021.709422.
3. *Wagner J., *Zinos A., Chen W-L., Conant L., Malloy M., Heffernan J., Quirk B., Sugar J., Prost R., Whelan J. B., **Beardsley S. A.**, Whelan H. T., (2021), Comparison of whole head functional near-infrared spectroscopy with functional magnetic imaging and potential application in pediatric neurology, *Pediatr. Neurol.*, 122, p. 68-75. doi: 10.1016/j.pediatrneurol.2021.06.003. PMID: 34301451.

4. Lantagne D. D., Mrotek L. A., Slick R. A., **Beardsley S. A.**, Thomas D. G., Scheidt R. A., (2021), Contributions of implicit and explicit memories to sensorimotor adaptation of movement extent during goal directed reaching, *Exp. Brain Res.*, p. 1-15. doi: 10.1007/s00221-021-06134-4. PMID: 34106298.
5. *Snyder D., Schmit B. D., Hyingstrom, A., **Beardsley S. A.**, (2021), Electroencephalography resting state networks in the stroke population, *Brain & Behavior*, 00:e02097, p. 1-17. doi: 10.1002/brb3.2097. PMCID: PMC8119848.
6. Chen W-L., *Wagner J., *Heugel H., Sugar J., Lee Y-W., Conant L., Malloy M., Heffernan J., Quirk B., *Zinos A., **Beardsley S. A.**, Prost R., Whelan H. T., (2020), Functional near-infrared spectroscopy and its clinical application in the field of neuroscience: Advances and future directions, *Front. Neurosci.* 14:724, p. 1-15. doi: 10.3389/fnins.2020.00724. PMCID: PMC7364176.
7. *Snyder D., **Beardsley S. A.**, Schmit B. D., (2019), Role of cortex in the control of arm stability, *J. Neurophysiol.* 122(5), p. 2156-2172. doi: 10.1152/jn.00003.2019. PMID: 31553682.
8. *Heugel N., Liebenthal, E., **Beardsley S. A.**, (2019), Method for spatial overlap estimation of electroencephalography and functional magnetic resonance imaging responses, *J. Neurosci. Methods*, 328, p. 1-10. doi: 10.1016/j.jneumeth.2019.108401. PMCID: PMC6810902.
9. Calabro F., **Beardsley S. A.**, Vaina L. M., (2019), Differential cortical activation during the perception of moving objects along different trajectories, *Exp. Brain Res.* p. 1-9. doi: 10.1007/s00221-019-05613-z. PMID: 31396645.
10. *Mangalathu J., Liebenthal, E., **Beardsley S. A.**, (2018), Optimizing within-subject experimental designs for jICA of multi-channel ERP and fMRI, *Front. Neurosci.*, 12:13, p.1-15. doi: 10.3389/fnins.2018.00013, PMCID: PMC5787094.
11. *Heenan, M., Scheidt R. A., Woo D., **Beardsley S. A.**, (2014), Intention tremor and deficits of sensory feedback control in Multiple Sclerosis: A pilot study, *J. NeuroEng. Rehab.*, 11:170, p.1-19. doi: 10.1186/1743-0003-11-170. PMCID: PMC4292988.
12. *Farmer, S., Silver-Thorn B., Voglewede P., **Beardsley S.A.** (2014), Within-socket myoelectric prediction of continuous ankle kinematics for control of a powered transtibial prosthesis, *J. Neural Eng.*, 11(5):056027. doi: 10.1088/1741-2560/11/5/056027. PMID: 25246110.
13. Liebenthal E., Sabri M., **Beardsley S. A.**, *Mangalathu J., Desai A., (2013), Neural dynamics of phonological processing in the dorsal auditory stream, *J. Neurosci.*, 33(39):15414-15424. doi: 10.1523/JNEUROSCI.1511-13.2013. PMCID: PMC3782621.
14. *Mangalathu J., **Beardsley S. A.**, Liebenthal, E., (2012), Within-subject joint independent component analysis of simultaneous fMRI / ERP in an auditory oddball paradigm, *NeuroImage*, 60(4): 2247-57. doi: 10.1016/j.neuroimage.2012.02.030. PMCID: PMC3321114.
15. Calabro F. J., **Beardsley S. A.**, Vaina L. M. (2011), Different motion cues are used to estimate time-to-arrival for frontoparallel and looming trajectories, *Vision Res.* (23-24): 2378-85. PMID: 22056519. doi: 10.1016/j.visres.2011.09.016. PMCID: PMC3390210.
16. **Beardsley S.A.**, Sikoglu E. M., Hecht H., Vaina L.M. (2011) Global flow impacts time-to-passage judgments based on local motion cues, *Vision Res.*, 51: 1880-1887. doi: 10.1016/j.visres.2011.07.003. PMCID: PMC3171144.
17. *Herzfeld D. J., **Beardsley S.A.**, (2010) Improved multi-unit decoding at the brain-machine interface using population temporal linear filtering, *J Neural Eng.*, 7(4): 046012. Epub 2010 Jul 19. doi: 10.1088/1741-2560/7/4/046012. PMID: 20644245.

18. *Sikoglu E. M., *Calabro F. J., **Beardsley S. A.**, Vaina L. M. (2010), Integration mechanisms for heading perception, *Seeing and Perceiving*, 23(3): 197-221. doi: 10.1163/187847510X503605. PMID: PMC2935514.
19. **Beardsley S. A.**, Vaina L. M., (2008), An effect of relative motion on trajectory discrimination, *Vision Res.*, 48(8): 1040-1052. doi: 10.1016/j.visres.2008.01.009. PMID: PMC3171136.
20. **Beardsley S. A.**, Vaina L. M., (2006), Global motion mechanisms compensate local motion deficits in a patient with a bilateral occipital lobe lesion, *Exp. Brain Res.*, 173: 724-732. doi: 10.1007/s00221-006-0447-1. PMID: 16673065.
21. **Beardsley S. A.**, Vaina L. M., (2005), Psychophysical evidence for a radial motion bias in complex motion discrimination, *Vision Res.*, 45(12): 1569-1586. doi: 10.1016/j.visres.2004.11.025. PMID: 15781074.
22. **Beardsley S. A.**, Vaina L. M., (2005), How can a patient blind to radial motion discriminate shifts in the center-of-motion?, *J. Comput. Neurosci.*, 18: 55-66. doi: 10.1007/s10827-005-5473-z. PMID: 15789169.
23. **Beardsley S. A.**, Vaina L. M. (2004), A Functional Architecture for Motion Pattern Processing in MSTd, In: Thrun S, Saul K, and Scholkopf B (Eds.), *Advances in Neural Information Processing Systems 16*, The MIT Press, pp. 1451-1458.
24. **Beardsley S. A.**, Ward R. L., Vaina L. M., (2003), A neural network model of spiral-planar motion tuning in MSTd, *Vision Res.*, 43: 577-595. doi: 10.1016/s0042-6989(02)00608-9. PMID: 12595004.
25. **Beardsley S. A.**, Vaina L. M. (2001), A laterally interconnected neural architecture in MST accounts for psychophysical discrimination of complex motion patterns, *J. Comput. Neurosci.*, 10: 255-280. doi: 10.1023/a:1011264014799. PMID: 11443285.
26. Clifford C. W. G., **Beardsley S. A.**, Vaina L. M. (1999), The perception and discrimination of speed in complex motion, *Vision Res.*, 39: 2213-2227. doi: 10.1016/s0042-6989(98)00314-9. PMID: 10343803.
27. **Beardsley S. A.**, Vaina L. M. (1998), Computational modeling of optic flow selectivity in MSTd neurons, *Network: Comput. Neural Syst.* 9: 467-493.

Preprint Server

28. Lantagne D. D., Mrotek L. A., Slick R. A., **Beardsley S. A.**, Thomas D. G., Scheidt R. A., (2020), Contributions of implicit and explicit memories to sensorimotor adaptation of movement extent during goal directed reaching, *bioRxiv 2020.10.22.350645*, p. 1-32. doi: 10.1101/2020.10.22.350645

In Review/Revision

29. *Zabre-Gonzalez E. V., *Amieva-Alvarado D., **Beardsley S. A.**, (Accepted), Prediction of EMG activation profiles from gait kinematics and kinetics during multiple terrains, (EMBC 2021).
30. *Snyder D., **Beardsley S. A.**, Hyngstrom, A., Schmit B. D., (Submitted), Cortical effects of wrist tendon vibration during arm tracking in chronic stroke survivors, *Brain & Behavior*.

In Preparation

31. *Heugel N., **Beardsley S. A.**, Liebenthal, E., Coupling and decoupling of EEG and fMRI based on joint independent component analysis (jICA), *J. Neurosci. Methods*.

32. *Riem L., Schmit B. D., **Beardsley S. A.**, Object motion and simulated self-motion effects on dynamic balance control in MS, *IEEE Transactions on Neural Systems and Rehabilitation Engineering*.
33. *Heugel N., Liebenthal, E., **Beardsley S. A.**, Detectability of subcortical signals using joint independent component analysis, *Human Brain Mapping*.

PEER REVIEWED CONFERENCE PROCEEDINGS (* indicates student)

1. *Reim L., Schmit B. D., **Beardsley S. A.**, (2020), The Effect of Discrete Visual Perturbations on Balance Control during Gait, *Conf Proc IEEE Eng Med Biol Soc.*, Montreal Canada. doi: 10.1109/EMBC44109.2020.9176303. PMID: 33018676.
2. *Lantagne D., Mrotek L., **Beardsley S. A.**, Thomas D., Leigh D., Ahamed S., Scheidt R. A., (2019), The contribution of sensorimotor memories to implicit motor learning after concussion, *56th annual Rocky Mountain Bioengineering Symposium, Milwaukee, WI, p.1-6*.
3. *Wagner J. C., Ballardini G., Bommarito G., Inglese M. Casadio M., Canessa A., Iurato M., Scheidt R. A., **Beardsley S. A.** (2019), Decreased functional connectivity in sensorimotor brain networks in persons with multiple sclerosis and upper extremity dysfunction, *56th annual Rocky Mountain Bioengineering Symposium, Milwaukee, WI, p.1-6*.
4. *Hesprich S., **Beardsley S. A.**, (2019), Computational characterization of the cellular origins of electroencephalography, *9th International IEEE EMBS Conference on Neural Engineering, San Francisco, CA, p.1-4. doi: 10.1109/NER.2019.8716883*.
5. *Torres E., **Beardsley S. A.**, (2019), Cerebellar source localization using event-related potentials in a simple motor task, *9th International IEEE EMBS Conference on Neural Engineering, San Francisco, CA, p.1-4. doi: 10.1109/NER.2019.8716916*.
6. *Riem L., *Van Dehy J., Onushko T., **Beardsley, S. A.**, (2018), Inducing compensatory changes in gait similar to external perturbations using an immersive head mounted display, *IEEE Conference on Virtual Reality and 3D User Interfaces, Reutlingen, Germany, p.1-8. doi: 10.1109/VR.2018.8446432*
7. *Heenan M., Scheidt R. A., **Beardsley S. A.**, (2015), Visual delay adaptation reduces intention tremor in multiple sclerosis: a case series, *Conf. Proc. IEEE Eng. Med. Biol. Soc., Milan, Italy. doi: 10.1109/IEMBS.2011.6091839. PMID: PMC4061733*.
8. *Heenan M., Scheidt R. A., **Beardsley S. A.**, (2014), Age-related differentiation of sensorimotor control strategies during pursuit and compensatory tracking, *Conf Proc IEEE Eng Med Biol Soc., 2014:3562-5. doi: 10.1109/EMBC.2014.6944392. PMID: PMC4747107*.
9. *Holley D., Johnson M., Harris G., **Beardsley S. A.**, (2014), A modular low-clearance wrist orthosis for improving wrist motion in children with cerebral palsy, *Conf Proc IEEE Eng Med Biol Soc., 2014:3069-72. doi: 10.1109/EMBC.2014.6944271. PMID: 25570639*.
10. *Boyarski M., *Heenan M., **Beardsley S. A.**, Voglewede P. (2014), Determination of variable stiffness of a human elbow for human-robot interaction. *2014 ASME IDETC Mechanisms and Robotics Conference, Paper Number DETC2014-34420. V05BT08A073:1-6. doi: 10.1115/DETC2014-34420*.
11. *Herzfeld D. J., **Beardsley S. A.**, (2011) Synaptic weighting for physiological responses in recurrent spiking neural networks, *Conf. Proc. IEEE Eng. Med. Biol. Soc.: 4187-90. doi: 10.1109/IEMBS.2011.6091039. PMID: 22255262*.

12. *Heenan M., Scheidt R. A., **Beardsley S. A.**, (2011) Visual and proprioceptive contributions to compensatory and pursuit tracking movements in humans, *Conf. Proc. IEEE Eng. Med. Biol. Soc.:* 7356-59. PMID: 22256038.

BOOKS AND CHAPTERS

1. *Optic Flow and Beyond* (2004), Vaina L. M. V., **Beardsley S. A.**, and Rushton S. (Eds.), Synthese Library, Kluwer Academic Press, pp. 528.
2. **Beardsley, S. A.**, and Vaina L. M. (2004), Linking perception and neurophysiology: the computational power of inhibitory connections in cortex, In: Vaina L.M.V., Beardsley S.A., and Rushton S. (Eds.), *Optic Flow and Beyond*, Synthese Library, Kluwer Academic Press, pp. 183-221.
3. Sundareswaran V., **Beardsley, S. A.**, and Vaina L. M. (2004), Fast processing of image motion patterns arising from 3-D translational motion, In: Vaina L.M.V., Beardsley S.A., and Rushton S. (Eds.), *Optic Flow and Beyond*, Synthese Library, Kluwer Academic Press, pp. 273-287.
4. Vaina L. M. and **Beardsley S. A.** (2003), Optic Flow, In: Adelman G., & Smith B. H. (Eds.), *Encyclopedia of Neuroscience 3rd ed.*, Elsevier Science.

CONFERENCE ABSTRACTS

1. Wagner J. C., Ballardini G., Bommarito G., Inglese M. Casadio M., Canessa A., Iurato M., Scheidt R. A., **Beardsley S. A.** (2019), Neural correlates of decreased functional connectivity related to sensorimotor control dysfunction in persons with Multiple Sclerosis, Soc. Neurosci., Chicago, IL.
2. Reim L., Onushko T., **Beardsley S.A.**, Schmit B., (2019), Increased anterior posterior response to medial lateral visual field movements in Multiple Sclerosis, Biomedical Engineering Society Annual Meeting, Philadelphia, PA.
3. Torres E., **Beardsley S. A.**, (2018), Mapping of cerebellar patterns of activity using electroencephalography, Soc. Neurosci., San Diego, CA.
4. Heugel N., Liebenthal E., **Beardsley S. A.**, (2018), Nonlinear coupling of electroencephalography and functional magnetic resonance imaging responses to auditory syllables, Soc. Neurosci., San Diego, CA.
5. Reim L., Onushko T., Raab S., Beardsley S.A., Schmit B., (2018). Visual perturbations between immersive virtual reality modalities on healthy and Multiple Sclerosis participants' balance Control, Soc. Neurosci., San Diego, CA.
6. Lantagne D., Mrotek L., **Beardsley S. A.**, Thomas D., Smith C., Leigh D., Ahamed S., Scheidt R. A., (2018), Does motor memory usage change in concussed individuals performing a sensorimotor adaptation task?, Soc. Neurosci., San Diego, CA.
7. Torres E., **Beardsley S. A.**, (2018), A cerebellar-dipole effect in electroencephalography source localization, Biomedical Engineering Society Annual Meeting, Atlanta GA.
8. Riem L., **Beardsley S. A.**, (2018), The effect of medial-lateral visual displacements on center of mass shifts during stepping through an immersive virtual environment, Biomedical Engineering Society Annual Meeting, Atlanta GA.
9. Slick R., Lantagne D., Mrotek L., **Beardsley S. A.**, Thomas D., Leigh D., Ahamed S., Scheidt R. A., (2017), Memory use during implicit learning varies across sensory feedback conditions, but is not impacted by interposed self-assessments, Soc. Neurosci., Washington D.C.

10. Torres E., **Beardsley S. A.**, (2017), Source localization of cortico-cerebellar activity during a sensorimotor control task, Biomedical Engineering Society Annual Meeting, Phoenix, AZ.
11. Riem L., **Beardsley S. A.**, (2017), Gait compensation while walking in an immersive virtual environment with and without coupled treadmill-base perturbations, Biomedical Engineering Society Annual Meeting, Phoenix, AZ.
12. Heugel N., Liebenenthal E., **Beardsley S. A.**, (2017) Characterization of the spatial correspondence between simultaneous fMRI and EEG. Human Brain Mapping.
13. **Beardsley S. A.**, Scheidt R. A. (2016) Sensorimotor dynamics in the brain during intermittent control of goal-directed movements. International Society for Electrophysiology and Kinesiology (ISEK), Chicago, Online.
14. Heugel N., Liebenenthal E., **Beardsley S. A.**, (2016) Method to account for spatial bias in multimodal neuroimaging. Soc. Neurosci., San Diego, Program No. 271.17/LLL31, Online.
15. *Heenan M., Scheidt R. A., **Beardsley S. A.**, (2015) Visuomotor delay adaptation reduces intention tremor in multiple sclerosis: A case series. Soc. Neurosci., Chicago, Program No. 223.27/F44, Online.
16. *Heugel N., Liebenenthal E., **Beardsley S. A.**, (2015) A method to account for spatial biases in comparing EEG/MEG with fMRI. Soc. Neurosci., Chicago, Program No. 450.12/DD31, Online.
17. *Snyder D. B., **Beardsley S. A.**, Schmit B. D., (2015) Effects of wrist tendon vibration on cortical activity during arm stabilization. Soc. Neurosci., Chicago, Program No. 610.05/P10, Online.
18. *Hesprich S. J., **Beardsley S. A.**, (2015) Computational modeling of the relationship between current dipoles and neural activity. Soc. Neurosci., Chicago, Program No. 95.23/CC5, Online.
19. *Heenan M. L., Scheidt R. A., **Beardsley S. A.**, (2014) Visual delay adaptation to reduce intention tremor in multiple sclerosis, ACTRIMS/ECTRIMS, Boston, ECTRIMS Online Library. Heenan M. Oct 11, 2014; 64513.
20. *Heenan M., Scheidt R. A., Woo D., **Beardsley S. A.**, (2014) The role of visual feedback in movement control in individuals with Multiple Sclerosis, Cooperative Meeting of CMSC and ACTRIMS. International Journal of MS Care: 2014, Vol. 16, No. S3, pp. 1-113. [abstract RH31].
21. *Snyder D. B., **Beardsley S. A.**, Schmit B. D., (2014) The role of the cortex in the control of arm stability. Soc. Neurosci., Washington D.C., Program No. 251.17/JJ27, Online.
22. *Heenan M., Scheidt R. A., **Beardsley S. A.**, (2013) Age-related differentiation of sensorimotor control strategies during pursuit and compensatory tracking. Soc. Neurosci., San Diego, Program No. 650.14/TT10, Online.
23. *Heugel N., Liebenenthal E., **Beardsley S. A.**, (2013) JICA integration of MEG with fMRI and EEG to improve neural source reconstruction within subjects. Soc. Neurosci., San Diego, Program No. 679.05/NNN4, Online.
24. **Beardsley S. A.**, Calabro F. J., Vaina L. M., (2013) Identification of an intercept trajectory among multiple moving objects in a scene is enhanced by self-motion. Soc. Neurosci., San Diego, Program No. 458.15/WW4, Online.
25. *Heenan M., Scheidt R. A., Woo D., **Beardsley S. A.**, (2013) Impairments in sensorimotor control in individuals with Multiple Sclerosis [CMSC abstract P44]. *Int J MS Care*. 2013;15(suppl 3):37.
26. *Magalathu J., Liebenenthal E., **Beardsley S. A.**, (2012) Theoretical evaluation of Joint-Independent Component Analysis for the integration of multi-channel ERP and fMRI data. Soc. Neurosci., New Orleans, Program No. 301.01/DDD75, Online.

27. *Heenan M., Scheidt R. A., Woo D., Bobholz J., **Beardsley S. A.**, (2012) Impairments in sensorimotor control during pursuit and compensatory tracking tasks in individuals with Multiple Sclerosis. Soc. Neurosci., New Orleans, Program No. 680.01/NN8, Online.
28. *Herzfeld D. J., **Beardsley S. A.**, (2011) Nonlinear relationships between mean firing rates and simulated hemodynamic responses, Soc. Neurosci., Washington DC, Program No. 507.23/WW61, Online.
29. *Magalathu J., Liebenthal E., **Beardsley S. A.**, (2011) Experimental and theoretical evaluation of joint-independent component analysis for the integration of multi-channel ERP and fMRI data. Soc. Neurosci., Washington DC, Program No. 647.08, Online.
30. *Heenan M., Scheidt R. A., Woo D., Bobholz J., **Beardsley S. A.**, (2011) Characterizing the sources of impaired sensorimotor control in patients with Multiple Sclerosis. Soc. Neurosci., Washington DC, Program No. 589.05/LL10, Online.
31. *Sukerkar P. J., Scheidt R. A., **Beardsley S. A.**, (2010) Source localization of sensory error signals during goal-directed movement using EEG. Soc. Neurosci., San Diego, CA, Program No. 582.11/VV5, Online.
32. *Magalathu J., Liebenthal E., **Beardsley S. A.**, (2010) Integration of EEG-fMRI in an auditory oddball paradigm using joint-independent component analysis. Soc. Neurosci., San Diego, CA, Program No. 838.3, Online.
33. *Magalathu J., Liebenthal E., **Beardsley S. A.**, (2010) Integration of EEG-fMRI in an auditory oddball paradigm using joint-independent component analysis. Advances and Perspectives in Auditory Neurophysiology. San Diego, CA.
34. *Galbraith B., Struble C., **Beardsley S. A.**, Ge R., (2009) CUSUMMA: Scalable Matrix-Matrix Multiplication on GPU's with CUDA, The 21st ACM/IEEE International Conference on High Performance Computing and Communications.
35. *Herzfeld D. J., **Beardsley S. A.**, (2009) Improved multi-unit decoding at the brain-machine interface using population temporal linear filtering, Soc. Neurosci., 33. Chicago, IL.
36. *Wakde S., **Beardsley S. A.** (2009), Task dependent learning of complex motion across visual motion areas, Soc. Neurosci., 33. Chicago, IL.
37. *Poladia C., Scheidt R. A., **Beardsley S. A.**, (2009) Characterizing sensorimotor integration during wrist stabilization: a systems identification approach. Soc. Neurosci., 33. Chicago, IL.
38. *Magalathu J., Liebenthal E., **Beardsley S. A.**, (2009) Within subject joint independent component analysis of simultaneous fMRI/EEG in an auditory oddball paradigm. Soc. Neurosci., 33. Chicago, IL.
39. *Poladia C., Scheidt R. A., **Beardsley S. A.**, (2008) Systems Identification of Sensory-Motor Control for Visually Guided Wrist Movements, Soc. Neurosci., 32, Washington DC.
40. *Dharampal T., **Beardsley S. A.**, (2008) An adaptive filtering approach for long term decoding of nonstationary neural signals, Soc. Neurosci., 32, Washington DC.
41. *Dharampal T., **Beardsley S. A.**, (2008), Adaptive real-time decoding of nonstationary signals at the neuronal-electrode interface for long-term control of cortical neuroprostheses, *International Conference on Cognitive and Neural Systems*, May 14-17, Boston, MA.
42. *Wakde S., **Beardsley S. A.**, (2007) Determining the Site of Perceptual Learning: Task Dependent Learning of Complex Motion, National Society of Black Engineers, March 19-23.
43. **Beardsley, S. A.** (2006), Population-temporal decoding of multi-unit signals at the brain-machine interface, *Smart Prosthetics: Exploring Assistive Devices for the Body and Mind*, The National Academies Keck Futures Initiative, Nov. 9-11, Irvine CA.

44. *Sikoglu E., **Beardsley S. A.**, Calabro, F. J., Vaina L. M. (2006), Comparison of 2D and 3D ideal observers to characterize heading perception with directional range noise, *J. Vision*, 6(6): 632a.
45. Calabro, F. J., **Beardsley, S. A.**, Vaina, L. M. (2005), The contribution of disparity to motion contrast segmentation, *J. Vision*, 5(8): 726a.
46. **Beardsley, S. A.**, Vaina, L. M. (2004), Improved complex motion discrimination in a patient with a bilateral occipital lobe lesion, *J. Vision*, 4(8): 855a.
47. Calabro, F. J., **Beardsley, S. A.**, Vaina, L. M. (2004), Effects of disparity and noise on motion transparency, *J. Vision*, 4(8): 857a.
48. **Beardsley S. A.**, Vaina L. M. (2003), A Functional Architecture for Motion Pattern Processing in MSTd, *Neural Information Processing Systems*, Vancouver, British Columbia, Canada.
49. Sikoglu E., **Beardsley S. A.**, Vaina L. M. (2003), A generalized mathematical model of feed-forward neural structures in the MT-MST complex, *Seventh International Conference on Cognitive and Neural Systems*, Boston, MA, p 20.
50. **Beardsley S. A.**, Vaina L. M. (2002), Discrimination of shifted centers-of-motion in a patient that cannot perceive radial motion, *Vision Sciences Society*, Sarasota FL, p 226.
51. Kao W. Y., **Beardsley S. A.**, Vaina L. M. (2002), Perceptual learning of motion pattern discrimination: Psychophysics and computational modeling, *Vision Sciences Society*, Sarasota FL, p 30.
52. **Beardsley S. A.**, Vaina L. M. (2001), Psychophysical evidence for a relative object motion mechanism in humans, *Assoc. Res. Vis. Ophthalmol.*, 42(4): S618.
53. Vaina L. M., **Beardsley S. A.**, Goldberg M. E., Rizzo J. (2000), Impaired complex motion perception in two patients with Balint-Holmes Syndrome, *Amer. Neurol. Assoc.*
54. **Beardsley S. A.**, Vaina L. M. (2000), Processing relative object motion in complex patterns of motion, *Assoc. Res. Vis. Ophthalmol.*, 41(4): S722.
55. Giulianini, F., Vaina, L., **Beardsley, S. A.** (1999), Memory for angular velocity: a psychophysical study, *Perception*, 28(S), p 79.
56. **Beardsley S. A.**, Clifford C. W. G., Vaina L. M. (1999), Discrimination of complex motion patterns is consistent with an interconnected population code in MST, *Assoc. Res. Vis. Ophthalmol.*, 40(4): S422.
57. **Beardsley S. A.**, Clifford C. W. G., Vaina L. M. (1998), Discrimination of shifted centers of motion in complex stimuli, *Assoc. Res. Vis. Ophthalmol.*, 39(4): S621.
58. **Beardsley S. A.**, Vaina L. M. (1997), Computational modeling of optic flow selectivity in MSTd neurons, *Assoc. Res. Vis. Ophthalmol.*, 38(4): S80.

INVITED PRESENTATIONS

National:

Timing matters: Sensorimotor dysfunction and individually targeted strategies to improve goal-directed movement, Wallace H. Coulter Foundation Biomedical Engineering Seminar, Florida International University, Miami FL, Oct. (2019).

Sensorimotor dynamics in the brain during intermittent control of goal-directed movements. International Society for Electrophysiology and Kinesiology (ISEK), Chicago IL, (2016).

Quantitative methods for diagnosing neurovisual deficits, *35th Annual Oak Ridge Conference, New Approaches to Diagnosing Neurological Diseases: Brainstorming for Clinical Laboratories*, Arlington VA, April (2003).

Local:

Marquette University, Biomedical Engineering Society, "Goal-directed impairment of sensorimotor control in MS", Feb. (2016).

Medical College of Wisconsin, Advancing a Healthier Wisconsin, "Assessment of coupling between mass neural activity and the hemodynamic response in humans", May (2014).

University of Wisconsin – Milwaukee, Bioengineering Seminar, "Impairments in sensorimotor control during goal-directed movement in Multiple Sclerosis", Feb. (2013).

University of Wisconsin – Whitewater, Frontiers of Engineering and Physics, "Everything you wanted to know about Biomedical Engineering but were afraid to ask", Oct. (2012).

Marquette University, Office of Research and Sponsored Programs - One Thing Led to Another, "From the universe without to the universe within", Sept. (2012).

Marquette University, High Performance Computing Seminar, "Population-temporal decoding of multi-unit signals at the brain-machine interface", March (2009).

University of Wisconsin – Whitewater, Physics Colloquium, "Frontiers of engineering and physics: Biomedical engineering", November (2007).

Marquette University, INRC Seminar Series, "Real-time adaptive neural decoding for long-term control of a smart prosthesis", October (2007).

Illinois Institute of Technology, Pritzker Institute of Biomedical Science and Engineering Seminar, "Linking neurons and behavior: A tale of two cities" September (2007).

University of Wisconsin – Whitewater, Physics Colloquium, "What were you thinking? Decoding neural signals at the brain-machine interface", October (2006).

Marquette University, Brotz Seminar Series, "Linking neurons and behavior: Integrating psychophysics and computational modeling to understand the nature of complex motion processing", April (2005).

Massachusetts Institute of Technology, Cognitive Lunch Seminar, Dept. of Brain and Cognitive Sciences, "How can a patient blind to radial motion discriminate shifts in the center-of-motion?", February (2004).

University of Massachusetts – Boston, Talks in Cognitive Science, "Motion pattern processing in MSTd: a computational model", May (2003).

Boston University, Brain Hurricane: Vision and the Brain, "A computational model for a surprising global motion deficit found in a patient", June (2002).

Boston University, Brain Hurricane: Vision and the Brain, "Opponent inhibition can account for discrimination in complex motion patterns", June (2002).

Linking the perception and physiology of motion pattern processing: The computational power of a laterally interconnected neural architecture in MST, *Optic Flow and Beyond Symposium*, Boston University, May (2001).

Massachusetts Institute of Technology, Cognitive Lunch Seminar, Dept. of Brain and Cognitive Sciences, "Perceptual discrimination of graded motion patterns: Modeling psychophysical performance using a laterally interconnected neural architecture in MST", September 19 (2000).

Symposia

International:

Tutorial: Computational neurophysiology of vision – Coding and decoding in the visual system, *Sampling Computational Vision Mini-Symposium, to the Symposium Functional Plasticity and Cortical Reorganization in the Human Visual and Motor Systems*, Bologna, Italy, December 12-16 (2003).

Symmetric complex motion perception in a biased neural representation, *Sampling Computational Vision Mini-Symposium, to the Symposium Functional Plasticity and Cortical Reorganization in the Human Visual and Motor Systems*, Bologna, Italy, December 12-16 (2003).

PROFESSIONAL SERVICE

Manuscript Reviewer: Frontiers in Neuroscience, Journal of Neuroscience Methods, Journal of Neural Engineering, PLOS One, Journal of Vision, Annals of Biomedical Engineering, Attention Perception and Psychophysics, Journal of Neurophysiology, Journal of Computational Neuroscience, Perception and Psychophysics

Grant Reviewer: National Institutes of Health - Emerging Technologies and Training in Neurosciences (ETTN) Integrated Review Group (study section member and co-Chair), National Institutes of Health - Fellowships: Biophysical, Physiological, Pharmacological and Bioengineering Neuroscience Study Section, National Institutes of Health - NIH Director's Early Independence Awards (DP5) (*ad-hoc*), Army Research Office (*ad-hoc*), National Institutes of Health – ARRA (*ad-hoc*), Netherlands Organization for Scientific Research (*ad-hoc*), Grant Writing Fellowship Advisory Board, UW-Whitewater

UNIVERSITY SERVICE

University:	Neuroscience Program Executive Committee	(2018-present)
	High Performance Computing Governance Committee	(Chair; Fall 2012-Spring 2018)
	High Performance Computing Task Force	(Spring 2012)
College:	Design Day Coordinator	(2015-present)
	Undergraduate Research Committee	(Spring 2013-2016)
	College Curriculum Committee	(Spring 2011-present)
	Academic Honesty College Panel	(Fall 2011-Spring 2015)
Department:	Interim Vice Chair of Academic Affairs	(Fall 2016)
	Undergraduate Curriculum Committee	(Chair; Fall 2010-present) (Member: 2006-present)
	Senior Design Team Advisor	(2006-present)

PROFESSIONAL DEVELOPMENT

COE Community of Practice	(2017-2020)
KEEN Faculty Development Seminar	(May 13, 2015)
Lafferty seminar on active learning, Marquette University	(February 15, 2013)
Methods in grant preparation course, Clinical and Translational Science Institute	(March - May 2012)
NSF CAREER workshop, Marquette University	(Feb. - May 2012)
Faculty seminar in catholic higher education, Marquette University	(Jan. – April 2009)

MENTORSHIP AND EDUCATION

Graduate:

Julie Wagner – Ph.D. student
 Lara Riem (co-directed w/ Brian Schmit) – Ph.D. student
 Erika Zabre – Ph.D. student (Awarded: Arthur J. Schmitt Fellowship, 2018)
 Anthony Zinos – Ph.D. student
 John Eganhouse – MS student
 Jared Pilet – MS student

Undergraduate:

Bob Dirmish, Gavin DeGroot, Frankie Ingram

Past Students**Graduate:**

Nicholas Heugel (Ph.D., 2020);	Research Engineer, Washington University
Dylan Snyder (Ph.D., 2019);	
Shane Hesprich (M.S. 2019);	HPC Research Engineer, Marquette University
Devon Holley (M.S. 2016);	Product Development Engineer, Cardiovascular Systems Inc.
Megan Heenan (Ph.D., 2015);	Rice 360° Institute for Global Health
Awarded: Johnson's Wax Research Assistantship, 2011; Arthur J. Schmitt Fellowship, 2012.	
Vincent Dang (M.S., 2013);	Nebraska-Western Iowa VA Medical Center
Jain Mangalathu (Ph.D., 2012);	Senior Systems Engineer, Siemens Healthcare
David Herzfeld (M.S., 2011);	Postdoc, Duke University School of Medicine
Tushar Dharampal (M.S., 2011);	Senior Design Assurance Engineer, St. Jude Medical
Sampada Wakde (M.S., 2011);	Instructor, Medi-Caps Institute of Technology and Management, Indore, India
Prajakta Sukerkar (M.S., 2010);	
Chintan Poladia (M.S., 2009);	Director, Quality Engineering at BrightInsight

Undergraduate:

Natalie Wideman
 Michelle Kaczmarczyk
 Claudia Melendez
 Efrain Torres (B.S. 2019; NSF-GRFP Recipient) Ph.D. Program in BME, University of Minnesota
 Arlaeth Ferrusquia Lopez (B.S. 2019)
 Lara Riem (B.S., 2018); Ph.D. Program in BME, MCW and Marquette University
 Katherine Ramos-Delgado (B.S., 2018);
 Nisa Khan (B.S., 2016);
 Valay Shah (B.S., 2015); BME B.S./M.S. Program, Marquette University
 Richard Schroeder (B.S., 2015); BME B.S./M.S. Program, Marquette University
 Samuel Farmer (B.S., 2014);
 Daniel Comaduran (B.S., 2012);
 Andrew Weingart (B.S., 2012); Technical Professional Development Program, Hospira
 Emily Foley/Waller (B.S., 2011); Research Assistant, Clinical Research Advantage
 David Herzfeld (B.S., 2010); Ph.D. Program in Biomedical Engineering, Johns Hopkins
 Mohammad-Ali Jazayeri (B.S., 2009); Medical School, Medical College of Wisconsin

Thesis and Dissertation Committees**Director:**

Nicholas Heugel, Ph.D. in Biomedical Engineering (May 2020), *Characterization of neuroimage*

coupling between EEG and fMRI using within-subject joint independent component analysis.

(co-director) Dylan Snyder, Ph.D. in Biomedical Engineering (Dec. 2019), *EEG characterization of sensorimotor networks: Implications of stroke.*

Shane Hesprich, M.S. in Biomedical Engineering (Aug. 2019), *Computational characterization of cellular contributions to electroencephalography.*

Devon Holley, M.S. in Biomedical Engineering (Dec. 2016), *Evaluation of an actuated wrist orthosis for use in assistive upper extremity rehabilitation.*

Megan Heenan, Ph.D. in Biomedical Engineering (May 2015), *Identification and retraining of sensorimotor deficits to reduce intention tremor in Multiple Sclerosis.*

Yagna Pathak, Ph.D. in Biomedical Engineering (Dec. 2014), *Neuromodulation for depression: Insights gained from neuroimaging and computational models.*

Vincent Dang, M.S. in Biomedical Engineering (Dec. 2013), *Characterization of two-dimensional oculomotor control during goal-directed eye-movements in humans.*

Jain Mangalathu, Ph.D. in Biomedical Engineering (July 2012), *Integration of EEG-fMRI in an auditory oddball paradigm using joint independent component analysis.*

David Herzfeld, M.S. in Biomedical Engineering (July 2011), *Modeling and computational framework for the specification and simulation of large-scale spiking neural networks.*

Tushar Dharampal, M.S. in Biomedical Engineering (July 2011), *Adaptive real-time decoding of brain signals for long-term control of a neuro-prosthetic device.*

Sampada Wakde, M.S. in Biomedical Engineering (July 2011), *Asymmetric transfer of task dependent perceptual learning in visual motion processing.*

Prajakta Sukerkar, M.S. in Biomedical Engineering (Dec. 2010), *EEG source localization of visual and proprioceptive error processing during visually-guided target tracking with the wrist.*

Chintan Poladia, M.S. in Biomedical Engineering (July 2009), *Systems identification of sensorimotor control for visually guided wrist movements.*

Member:

Benjamin Kalinosky, 2016, Ph.D. – Biomedical Engineering

Yagna Pathak, 2014 Ph.D. – Biomedical Engineering

Brian Goodwin, 2014 Ph.D. – Biomedical Engineering

Nichole Salowitz, 2014 Ph.D. – Biomedical Engineering

Michael Boyarsky 2014 M.S. – Mechanical Engineering

Ryan McKindles, 2013 Ph.D. – Biomedical Engineering

Yan Ma, 2013 Ph.D. – Biomedical Engineering

Mathew Chua, 2013 Ph.D. – Biomedical Engineering

Joseph Lee, 2012 Ph.D. – Biomedical Engineering

Nutta-On Promjunyakul, 2012 Ph.D. – Biomedical Engineering

Jeannette Vizuete, 2012 Ph.D. – Biomedical Engineering

Kakanand Srungboonmee, 2011 Ph.D. – Biomedical Engineering

Cjhiran Doshi, 2011 M.S. – Biomedical Engineering

Bani Gadhoke, 2011 M.S. – Biomedical Engineering

Elif Sikoglu, 2010 Ph.D. – Biomedical Engineering (Boston University),

Finnegan Calabaro, 2010 Ph.D. – Biomedical Engineering (Boston University)

Byron Galbraith, 2010 MS – Mathematics and Computer Science

Megan Conrad, 2009 Ph.D. – Biomedical Engineering

Supriya Asnani, 2008 M.S. – Biomedical Engineering

Promita Hazra, 2008 M.S. – Biomedical Engineering

Brinda Ramachandran, 2008 M.S. – Biomedical Engineering
Mary Jo Maciejewski, 2007 Ph.D. – Biomedical Engineering

Other Graduate Research Directed

Lance Graham, (M.S. Thesis), Dec. 2008 – May 2009, Design of an actively controlled lower limb prosthesis controlled by naturally occurring electromyographic signals. MSOE and Lübeck University of Applied Sciences.

Undergraduate Research (#NIH-IRES Fellowship recipient, **Summer Research Fellowship recipient)

Individual Research:

#Frankie Ingram (Summer 2021), *Characterization of optic nerve impairment in people with Multiple Sclerosis (MS) using visually evoked potentials*

**Gavin DeGroot (Summer 2021), *Characterization of artifact reduction techniques for integrated fNIRS/EEG imaging of task-related brain activity*

#Michelle Kaczmarczyk (Summer 2020), *Electronic analysis of hand-writing dysfunction in people with Multiple Sclerosis*

**Natalie Wideman (Summer 2020), *EEG assessment of signal transduction delays during visual processing in persons with Multiple Sclerosis (MS)*

**Bob Dirmish (Summer 2019), *Virtual reality avatar for dynamic walking*

**Robert Guzek (Summer 2019), *Analysis of epilepsy using electroencephalography (EEG) between male and female subjects*

**Efrain Torres (Summer 2018), *Dynamic connectivity analysis of brain networks that mediate sensorimotor control in persons with Multiple Sclerosis*

**Arlaeth Ferrusquia Lopez (Summer 2018), *Characterization of electrode performance for within-socket sensing of EMG activity.*

**Robert Guzek (Summer 2018), *Analysis and mapping of rare forms of epilepsy using electroencephalography (EEG).*

**Efrain Torres (Summer 2017), *Functional connectivity analysis of brain networks in pediatric tumor patients.*

**Mark Gotthelf (Summer 2017), *Clinical testing of an actuated wrist orthosis to improve arm movement in children with Cerebral Palsy.*

**Alex Dums (Summer 2017), *Electro-active polymers for use in articulation of a prosthetic joint.*

**Katherine Ramos-Delgado (Summer 2017), *Low-cost computer-based system for delay adaptation to reduce intention tremor in persons with Multiple Sclerosis.*

**Lara Reim, (Summer 2016), *Responsive virtual reality.*

**Nisa Khan, (Summer 2016), *EMG prediction of lower extremity joint angle across mobility tasks.*

**Nisa Khan, (Summer 2015), *Upper extremity testing of an actuated wrist orthosis to improve arm movement in children with Cerebral Palsy.*

**Maleah Brody, (Summer 2015), *Prediction of continuous ankle kinematics across mobility tasks using surface EMGs.*

**Adam Hunter, (Summer 2015), *Streamlining communication methods of individuals with Cerebral Palsy.*

Chandan Matta, (Summer 2015), *Multi-dimensional EMG control of a hand prosthesis.*

Richard Schroeder, (Summer 2014), *EEG characterization of sensory processing delays in Multiple Sclerosis.*

Matthew Jung, (Summer 2014), *Characterization of brain activity in response to driving task complexity in an immersive virtual reality environment.*

Miguel Sotelo, (Summer 2013), *Development of a multi-display virtual environment to provide immersive visual feedback during human walking and navigation.*

Richard Schroeder, (Summer 2013), *Continuous myoelectric prediction of leg kinematics across mobility tasks for control of a trans-tibial prosthesis.*

Samuel Farmer, (Sept. 2012 – Dec. 2013), *Discrimination and classification of gait patterns using myoelectric signals in trans-tibial amputees.*

Daniel Comaduran, (Fall 2011), *Quantitative analysis of goal-directed movement and its impairment in Multiple Sclerosis.*

Andrew Weingart (Summer 2011), *An automated algorithm for the characterization of intermittency during visually-guided movement.*

Emily Foley (Spring 2010), *Motion segmentation during a two-alternative forced-choice center of motion discrimination task.*

David Herzfeld (June 2009 – Aug. 2010), *Multi-unit decoding at the brain-machine interface using population temporal linear filtering.*

Mohammad-Ali Jazayeri (Sept. 2008 – May 2009), *Measurement and characterization of eye movements during visual motion processing.*

Jacqueline Locke (Summer 2007), *Generation and transmission of neural signals for performance assessment of a decoding algorithm.*

Extracurricular Group Research:

Virtual Space Project - An omnidirectional platform for locomotion through virtual environments
(Student-centered design project; 6 student team) 2/2011 – 5/2015

Senior Design Research Projects:

ProprioSense	2021
Myolite sensor	2020
Matthew's Mozart	2020
Mighty Braden	2019
Binary choice communication device	2019
Home Theraplay	2018
Motorized wheelchair dolly	2017
Improved design of surgical hand drills	2017
Power assistive device for manual wheelchair	2016
Electromyographic controlled prosthetic hand	2016
Active ankle foot orthosis	2015
EMG controlled hand prosthesis	2015
Adapted game system for spinal cord injury patients	2014
NG tube placement verification	2014
MCFI communication device (EEG/EOG-to-tablet interface)	2013
Electronic fishing reel	2012
GE Healthcare: Scanner independent phantom holder/lift device for next generation CT devices (Phantom Assist)	2011

Method for testing electronic stethoscopes	2010
Portable electronic system for real-time neural control of a prosthetic device	2009
Femoral head resection guide and tissue protector	2007

Curriculum Development

- Fall 2017:* BIEN4380/4390 – Bioelectronics Design Lab. Redesigned lab sequence to be design oriented. Labs cover basic sub-systems inherent to an embedded medical device (e.g., sensing, signal acquisition, amplification, filtering, A/D, microcontroller architecture/processing and control), and are structured to be open-ended with respect to component selection, device design, testing and validation. Assessments implemented using a variety of reporting formats to strengthen technical writing and presentation skills.
- Fall 2013:* BIEN 6210 – Advanced Signal Processing. Graduate course developed to introduce modern advanced methods for signal processing in the biomedical field including parametric modeling, modern spectral estimation, multivariate analysis, adaptive signal processing, decimation/interpolation, and two-dimensional signal analysis
- Spr. 2013:* BIEN 2300 - Biomedical Circuits and Electronics. Implemented integrated lecture/lab format utilizing NI ELVIS II systems. Three full lecture labs and weekly 4-phase assignment-based labs – (1) Prelab analysis of circuit as part of assignment, (2) in-lecture lab to build and test circuit using NI ELVIS II, (3) in-lecture review of circuit analysis, (4) student identification and correction of errors in assignment.
- Fall 2011:* BIEN 4600/5600 – Neural Engineering. Mixed undergraduate/graduate course developed to introduce basic principles of neural engineering including, properties of excitable tissues, quantitative models used to characterize natural and artificial stimulation, neural coding/decoding, and design of neuroprosthetic devices for sensory, motor and therapeutic applications.
- Fall 2010:* BIEN 3310 - Control Systems for Biomedical Engineers. Implemented as a new core undergraduate course to examine the characterization and design of control systems in physiology and biomedical applications. Case-based simulations and hands-on experiences are used to explore the dynamics and control of physiological and robotic systems, on topics including respiration, insulin-glucose control, sensorimotor control, and robotic assay systems.
- Fall 2010:* BIEN 1100 - Introduction to Biomedical Engineering Methods I. Developed a 2-week undergraduate course module on data acquisition and signal processing. Designed an interactive Matlab demo that enables students to explore concepts of data sampling, aliasing, and quantization. Implemented an accompanying laboratory sequence in which students use EEG to measure and analyze electrical brain activity in the context of a rudimentary brain-computer interface.
- Fall 2009:* BIEN 6931 - Computational Neuroscience (graduate standing). Special topics graduate course developed to introduce students to the tools and techniques used to model nervous system function and characterize computation in complex neural systems. Concepts associated with neural coding, computation, representation and dynamics in neurobiological systems are discussed with an emphasis on developing quantitative models of neural processing.
- Spr. 2007:* BIEN 2300 - Biomedical Circuits and Electronics. Created outside laboratory experiences and incorporated in-class examples of biomedical applications to better illustrate the importance of electrical circuit theory and design to non-bioelectrical engineering majors.